



Greenhouse Gas Emissions in Syria

Syria Numbers at a Glance

88.19 MtCO₂e ^(a)
Total GHG emissions
(0.19% of world total)
(2011)

World: 46,906 MtCO₂e

21,961,676

Population ^(b)
(2011)

World: 6,964,618,177

4.04

tCO₂e per capita
(2011)

World: 6.73 tCO₂e

US\$32,029 Million

GDP ^(c)
(2007)

World: US\$50,829 Billion

3,023

tCO₂e/million US\$ GDP ^(d)
(2007)

World: 864 tCO₂e/million US\$ GDP

+33.4 MtCO₂e (+61%)

Change in GHG emissions,
(1990-2011)

World: +12,969 MtCO₂e
(+38%)

Sources: WRI CAIT 2.0, 2016.

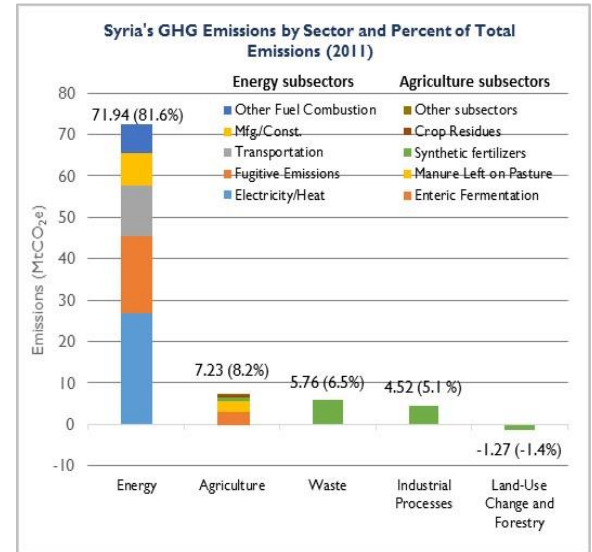
Emissions including Land-Use Change and Forestry

(a) Million metric tons of carbon dioxide equivalent. Global Warming Potentials are from the Intergovernmental Panel on Climate Change Second Assessment Report. (b) Syria's 2011 population, pre-conflict. According to the [UN Special Envoy to Syria](#), as of April 2016, the conflict has claimed 400,000 lives. [UNHCR](#) reports over 4.9 million registered Syrian refugees as of February 2017. (c) Gross Domestic Product (GDP) in constant 2005 US\$. (d) Syria's Total GHG emissions in 2007: 96.84 MtCO₂e

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Greenhouse Gas (GHG) Emissions by Sector

According to the World Resources Institute Climate Analysis Indicators Tool (WRI CAIT), Syria's 2011 GHG profile, was dominated by emissions from the energy sector.¹ Syria's [Initial National Communication \(INC\)](#) to the UNFCCC, which includes a GHG inventory for the period 1994-2005, also shows energy as the highest emitting sector.² In 2011, electricity and heat production and fugitive emissions contributed over 60% of energy sector emissions.³ Agriculture was the second highest emitting sector (8.2%), with enteric fermentation and manure left on pasture contributing almost 80% of agriculture emissions.⁴ Waste and industrial processes (IP) contributed 6.5% and 5.1% of total emissions, respectively. The land-use change and forestry (LUCF) sector was a net sink, absorbing more emissions than it released, removing 1.27 MtCO₂e in 2011.⁵



Sources: WRI CAIT 2.0, 2016, FAOSTAT, 2016

Change in GHG Emissions in Syria (1990-2011)

According to WRI CAIT, Syria's GHG emissions increased by 33.4 MtCO₂e from 1990 to 2011, led by growth in energy sector emissions. The average annual change in total emissions during this period was 2.4%, with sector-specific average annual changes as follows: energy (2.4%), agriculture (1.3%), waste (3.2%), IP (4.8%), and LUCF (-19.9%). With the outbreak of the 2011 Syrian conflict, data in 2012 (for which IP sector emissions are not available) show an 18% downturn in total emissions, driven almost entirely by a decrease in energy emissions.⁶ The 1990-2011 change in emissions and the impacts of the conflict after 2011 in the two highest emitting sectors are discussed below.

Energy: According to WRI CAIT data, Syria's energy sector emissions increased by 27.6 MtCO₂e between 1990 and 2011. Fugitive emissions and electricity and heat production were the leading sources of emissions during this period, but electricity and heat production (68%) and transportation (17%) were the main sources of the change in the sector's emissions during this period. Between 1990 and 2011, electricity generation more than tripled, with natural gas representing an increasing share of the electricity mix, and fuel oil and hydroelectric power a decreasing share. As of 2011, 53% of electricity was generated by natural gas, followed by fuel oil (39%) and hydro (8%).⁷

¹ World Resources Institute Climate Analysis Indicators Tool (WRI CAIT 2.0, 2016). Global Warming Potentials (GWPs) are from the Intergovernmental Panel on Climate Change (IPCC) [Second Assessment Report \(SAR\)](#). 2011 is the most recent year for which complete data are available.

² Syrian Arab Republic. Syria's [Initial National Communication \(INC\)](#) to the UNFCCC, 2010. The INC uses GWPs from the IPCC SAR.

³ WRI CAIT 2.0, 2016.

⁴ WRI CAIT 2.0, 2016 and Food and Agriculture Organization of the United Nations Statistics Division (FAOSTAT), [Emissions – Agriculture total](#), viewed on January 31, 2017.

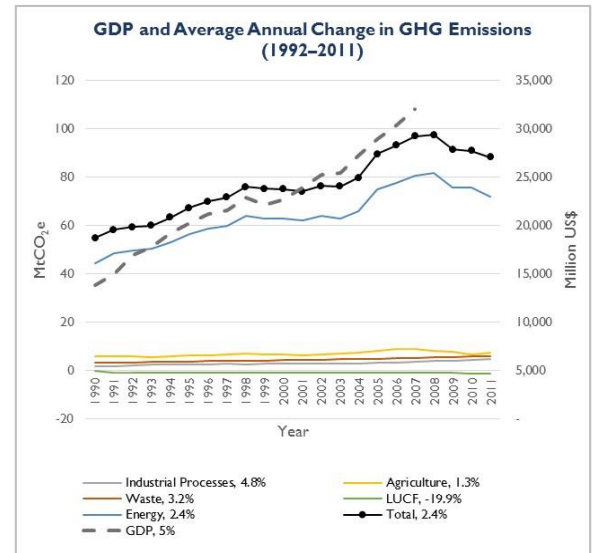
⁵ WRI CAIT 2.0, 2016.

⁶ Ibid.

⁷ International Energy Agency. Syria Electricity and Heat, [2011](#).

The Syrian conflict has had a significant impact on the energy sector. The country's well-developed energy infrastructure has been damaged and oil and gas production severely disrupted. Crude oil production in areas under government control has fallen sharply, declining to about 9,000 barrels/day (b/d) in 2014 from 386,000 b/d in 2010.⁸ Syria's two state-owned refineries, in Homs and Baniyas, were operating at half of their capacity in 2014, mainly due to damage to pipelines and other infrastructure around the refineries. Moreover, the shutdown of the Arab Gas Pipeline,⁹ Syria's only source of natural gas, has limited power generation. By early 2013, more than 30 of Syria's power stations were inactive, and at least 40% of the country's high voltage lines had been attacked.¹⁰ According to data from the International Energy Agency, electricity generation decreased 48% between 2011 and 2014.¹¹

Agriculture: According to WRI CAIT data, agriculture emissions increased by 23% from 1990 to 2011, driven by enteric fermentation from livestock and manure left on pasture.¹² According to Food and Agriculture Organization (FAO) data, the number of cattle, sheep and goats increased 41%, 25% and 129% respectively, during this period.¹³ Prior to 2011, livestock played a very significant role in the Syrian economy. Livestock production accounted for about 40% of the country's total agricultural production, and occupied about 20% of the labor force in rural areas. However, since 2011 many livestock owners have migrated from insecure areas, either bringing their livestock with them, selling off their stock, or simply abandoning them. The FAO estimates that since 2011, livestock production has declined by 30% in cattle, 40% in sheep and goats, and 50% in poultry.¹⁴



Source: WRI CAIT 2.0, 2016

Carbon Intensity: GHG Emissions Relative to Gross Domestic Product (GDP)

WRI CAIT does not show GDP data for Syria after 2007 because its main data source, the [World Bank](#), does not report GDP data for Syria after this date. According to WRI CAIT, GDP grew 132% from 1990 to 2007, averaging 5% annually, while GHG emissions increased 77% in the same period, averaging 3.5% annually. This indicates that prior to the conflict, GDP was growing faster than GHG emissions. However, as of 2007, Syria was emitting almost 4 times more GHGs relative to GDP than the world average. More recently, the International Monetary Fund projected that with the Syrian conflict, the economy has contracted in real terms by 57% since 2010. Non-oil real GDP declined on average by 14% between 2011 and 2015, while oil and gas GDP both fell by an average of 28% during the same period.¹⁵

Climate Change Mitigation Targets and Plans

Syria is one of the few countries that did not submit an Intended Nationally determined Contribution (INDC) to the UNFCCC ahead of the climate change negotiations at the Conference of Parties (COP 21) in Paris in December 2015. It has not signed the [Paris Agreement](#). Syria's INC noted several GHG mitigation actions that had been planned in the energy, agriculture, industrial, and waste sectors. In the electricity sector, Syria planned to improve the efficiency of its power plants; shift from fuel oil to natural gas; increase the share of renewable energy, including wind and solar, by 15.3% by 2030; and establish a 1600 MW nuclear power plant after 2020. In the oil and gas sector, Syria planned to increase the maintenance of oil and gas pipes to prevent leakages and to benefit from the Clean Development Mechanism through flare gas recovery; energy conservation in oil refining and gas liquefaction processes; and carbon storage in semi-depleted oil fields. In the agriculture sector, Syria planned to increase biogas production and apply conservation agriculture to cropland, livestock production systems, and forest management.¹⁶

⁸ International Monetary Fund (IMF), [IMF Working Paper – Syria's Conflict Economy](#), 2016.

⁹ The conflict and sanctions have affected the country's ability to receive natural gas. The Arab Gas Pipeline, which transports natural gas from Egypt, became the target of attacks as the conflict intensified, forcing the pipeline to shut down (IMF, 2016).

¹⁰ IMF, 2016.

¹¹ International Energy Agency. Syria Electricity and Heat, [2011](#) and [2014](#).

¹² FAOSTAT, 2016.

¹³ FAOSTAT. [Live Animals – Syrian Arab Republic](#), viewed on January 31, 2017.

¹⁴ FAO and the World Food Programme, [Special Report - FAO/WFP Crop and Food Security Assessment Mission to the Syrian Arab Republic](#), November 2016.

¹⁵ IMF, 2016. GDP represents the total value of final goods and services produced within a country during a specified time period, such as one year. But because GDP is collected at current, or nominal prices, one cannot compare two periods without making adjustments for inflation. To determine "real GDP", its nominal value must be adjusted to take into account price changes to determine whether the value of output has gone up because more is being produced or simply because prices have increased. A statistical tool called the price deflator is used to adjust GDP from nominal to constant prices (IMF, [Glossary of Selected Financial Terms](#) and [Gross Domestic Product: An Economy's All](#), viewed on February 5, 2017).

¹⁶ Syrian Arab Republic. Syria's [INC](#) to the UNFCCC, 2010.